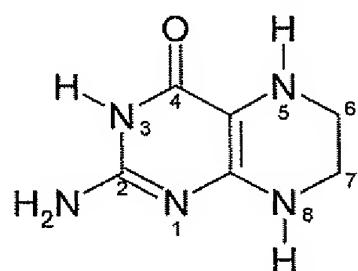


The listing of claims will replace all prior versions, and listings, of claims in the application:

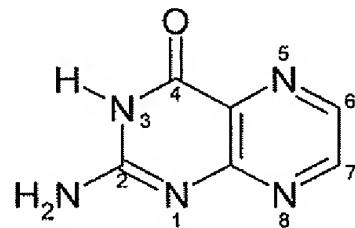
## **Listing of Claims:**

1. (Previously Presented) A process for preparing tetrahydropterin of the following formula



or a tetrahydropterin compound of said tetrahydropterin that is substituted at the 6-, or 7- or 6- and 7- position or positions,

comprising hydrogenating pterin of the following formula



or a pterin compound of said pterin that is monosubstituted at the 6-, or 7- or 6- and 7- position or positions,

with hydrogen in a polar reaction medium in the presence of a hydrogenation catalyst that is a metal complex that is soluble in the reaction medium, wherein the catalyst contains a ligand which is (i) triarylphosphine, (ii) tetramethylene phenylphosphine (iii) pentamethylene phenylphosphine, or (iv) a bidentate ligand with a tertiary amine group and a phosphine group or with two tertiary phosphine groups as complexing groups, wherein the bidentate ligands form together with a metal atom a five- to ten membered ring.

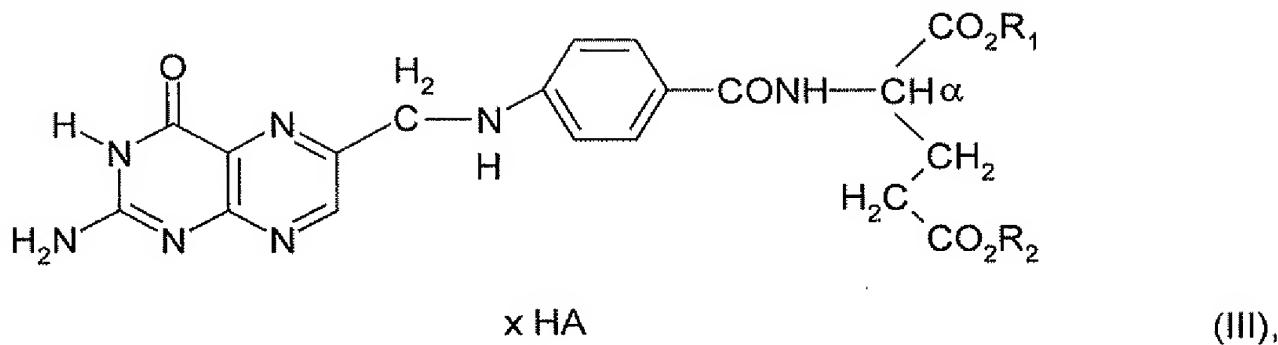
2. (Previously Presented) A process according to claim 1, wherein the polar reaction medium is an aqueous or alcoholic reaction medium.

3. (Previously Presented) A process according to claim 1, wherein the pterin compound is folic acid, a folic acid salt, a folic acid ester, a folic acid ester salt or a dihydro form thereof, with the proviso that in the event of using folic acid, a carboxylic acid thereof or a dihydro form thereof, the reaction medium is aqueous, and in the event of using a folic acid ester, a folic acid ester salt or a dihydro form thereof, the reaction medium is an alcohol.

4. (Previously Presented) A process according to claim 1, wherein the metal complex contains a chiral ligand.

5. (Previously Presented) A process according to claim 3, wherein the metal complex contains a chiral ligand.

6. (Previously Presented) A process according to claim 5, wherein the folic acid ester salt is of formula III and is in the form of a single enantiomer or a mixture of enantiomers of formula III,



in which

one of  $\text{R}_1$  or  $\text{R}_2$  is H, and the other one of  $\text{R}_1$  or  $\text{R}_2$  is a monovalent hydrocarbon radical or a hydrocarbon radical attached via a carbon atom in which one or more carbon atoms are each independently replaced by oxygen, sulfur, NH, -N=, or -N(C<sub>1</sub>-C<sub>4</sub> Alkyl)-, or both  $\text{R}_1$  and  $\text{R}_2$  independently of one another represent a monovalent hydrocarbon radical or a hydrocarbon radical attached via a carbon atom in which one or more carbon atoms are each independently replaced by oxygen, sulfur, NH, -N=, or -N(C<sub>1</sub>-C<sub>4</sub> Alkyl)-,

HA stands for a monobasic to tribasic inorganic or organic acid, and

x denotes an integer from 1 to 6 or a fractional number between 0 and 6.

7. (Previously Presented) A process according to claim 6, wherein HA is unsubstituted or substituted phenylsulphonic acid.

8. (Previously Presented) A process according to claim 1, wherein said process is carried out at a hydrogen pressure of 1 to 500 bars.

9. (Previously Presented) A process according to claim 1, wherein said process is carried out at a temperature is 0 to 150<sup>0</sup> C.

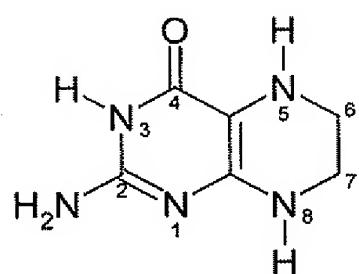
10. (Previously Presented) A process according to claim 1, wherein the molar ratio of pterin or pterin compound to catalyst is 10 to 100,000.

11. (Previously Presented) A process according to claim 1, wherein the reaction medium is water or water in admixture with an organic solvent.

12. (Previously Presented) A process according to claim 2, wherein the alcoholic reaction medium is an alcohol, or an alcohol in admixture with an organic solvent.

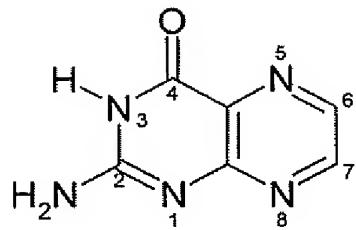
13. (Previously Presented) A process according to claim 1, wherein the metal complex contains a d-8 metal.

14. (Currently Amended) A process for preparing tetrahydropterin of the following formula



or a tetrahydropterin compound of said tetrahydropterin that is substituted at the 6-, or 7- or 6- and 7- position or positions,

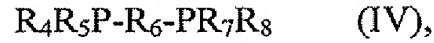
comprising hydrogenating pterin of the following formula



or a pterin compound of said pterin that is monosubstituted at the 6-, or 7- or 6- and 7- position or positions,

with hydrogen in a polar reaction medium in the presence of a hydrogenation catalyst that is a metal complex that is soluble in the reaction medium, wherein

the catalyst has a ligand that is of formula IV, V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XIX, XX, XXI, XXII, XXIII, XXIV, XXV, XXVI, XXVII, XXVIII, XXIX, XXX, XXXI, XXXII, XXXIII, XXXIV, XXXV, XXXVI, XXXVII, XXXVIII, XXXIX, XL, Y1 or Y2,

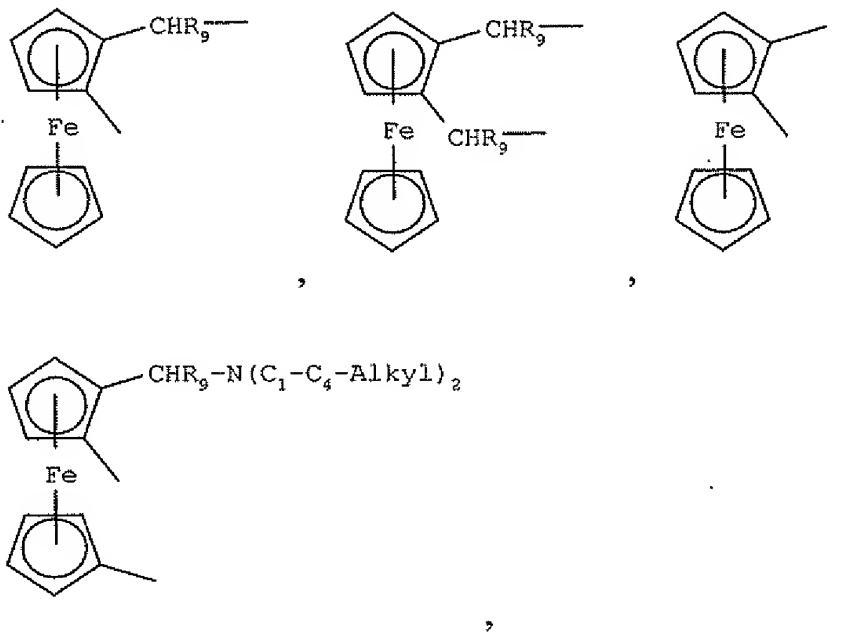


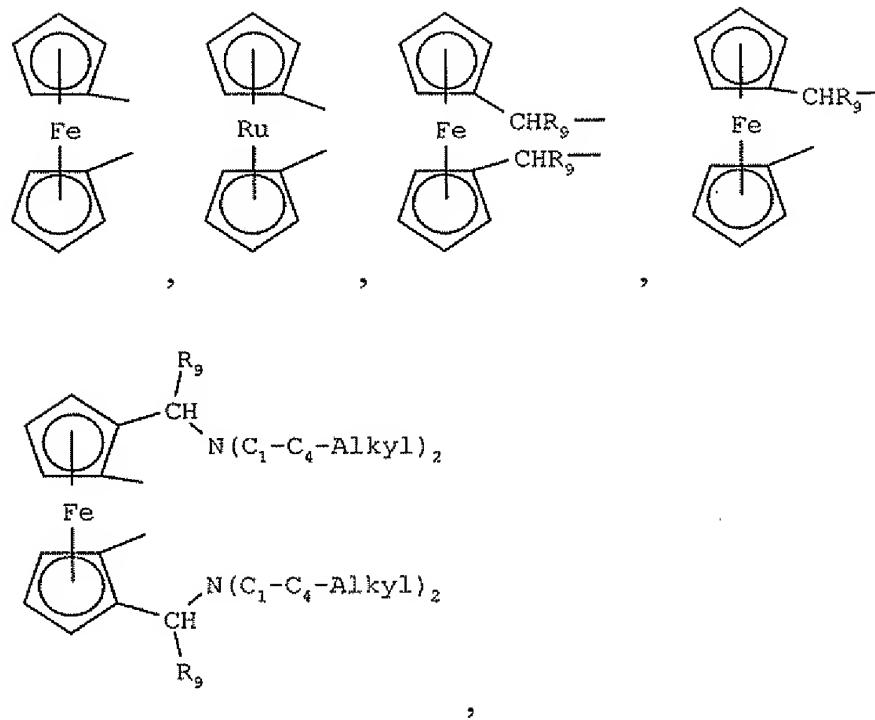
in which

$R_4$ ,  $R_5$ ,  $R_7$  and  $R_8$  independently of one another represent a hydrocarbon radical with 1 to 20 carbon atoms which are unsubstituted or substituted with halogen,  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -haloalkyl,  $C_1$ - $C_6$ -alkoxy,  $C_1$ - $C_6$ -haloalkoxy,  $(C_6H_5)_3Si$ ,  $(C_1$ - $C_{12}$ -alkyl) $_3Si$ ,  $-NH_2$ ,  $-NH(C_1$ - $C_{12}$ -alkyl),  $-NH(phenyl)$ ,  $-NH(benzyl)$ ,  $-N(C_1$ - $C_{12}$ -alkyl) $_2$ ,  $-N(phenyl)_2$ ,  $-N(benzyl)_2$ , morpholinyl, piperidinyl, pyrrolidinyl, piperazinyl, -ammonium- $X_3^-$ ,  $-SO_3M_1$ ,  $-CO_2M_1$ ,  $-PO_3(M_1)_2$ , or  $-CO_2-C_1$ - $C_6$ -alkyl, where  $M_1$  represents an alkali metal or hydrogen, and  $X_3^-$  is an anion of a monobasic acid; or  $R_4$  and  $R_5$  and/or  $R_7$  and  $R_8$  together denote tetramethylene, pentamethylene or 3-oxa-pentane-1,5-diyl, unsubstituted or substituted with halogen,  $C_1$ - $C_6$ -alkyl or  $C_1$ - $C_6$ -alkoxy, and

$R_6$  is  $C_2$ - $C_4$ -alkylene, unsubstituted or substituted with  $C_1$ - $C_6$ -alkyl,  $C_1$ - $C_6$ -alkoxy,  $C_5$ -cycloalkyl or  $C_6$ -cycloalkyl, phenyl, naphthyl or benzyl; 1,2- or 1,3-cycloalkylene, 1,2- or 1,3-

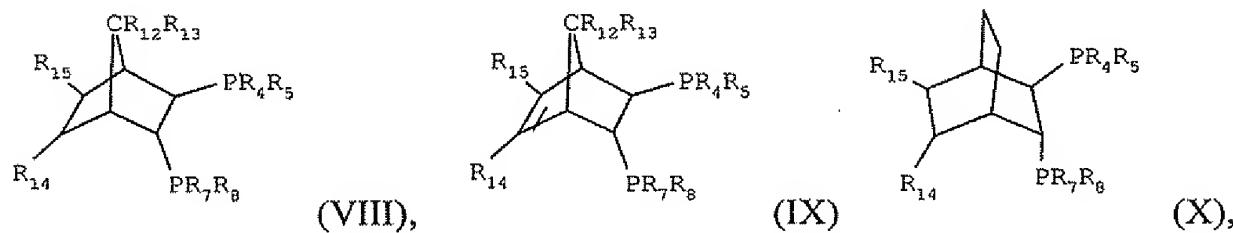
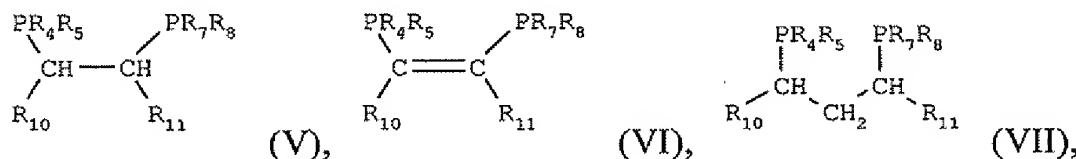
cycloalkenylene, 1,2- or 1,3-bicycloalkylene or 1,2- or 1,3-bicycloalkenylene with 4 to 10 carbon atoms, unsubstituted or substituted with C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl or benzyl; 1,2- or 1,3-cycloalkylene, 1,2- or 1,3-cycloalkenylene, 1,2- or 1,3-bicycloalkylene or 1,2- or 1,3-bicycloalkenylene with 4 to 10 carbon atoms, unsubstituted or substituted with C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl or benzyl, and attached at whose 1- and/or 2-position(s) or at whose 3-position is methylene or C<sub>2</sub>-C<sub>4</sub>-alkylidene; 1,4-butylene, substituted in the 2,3-positions with R<sub>9</sub>·R<sub>10</sub>C(O-)<sub>2</sub>, and in the 1- and/or 4-positions unsubstituted or substituted with C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl or benzyl, and where R<sub>9</sub> and R<sub>10</sub> independently of one another represent hydrogen, C<sub>1</sub>-C<sub>6</sub>-alkyl, phenyl or benzyl; 3,4- or 2,4-pyrrolidinylene or 2-methylene-4-pyrrolydanyl methylene-4-pyrrolidine-4-yl, the N-Atom of which is substituted with hydrogen, C<sub>1</sub>-C<sub>12</sub>-alkyl, phenyl, benzyl, C<sub>1</sub>-C<sub>12</sub>-alkoxycarbonyl, C<sub>1</sub>-C<sub>8</sub>-acyl, C<sub>1</sub>-C<sub>12</sub>-alkylamino carbonyl; or 1,2-phenylene, 2-benzylene, 1,2-xylylene, 1,8-naphthylene, 2,2'-dinaphthylene or 2,2'-diphenylene, unsubstituted or substituted with halogen, -OH, C<sub>1</sub>-C<sub>6</sub>-alkyl, C<sub>1</sub>-C<sub>6</sub>-alkoxy, phenyl, benzyl, phenoxy or benzyloxy; or R<sub>6</sub> stands for a radical of one of the following formulas

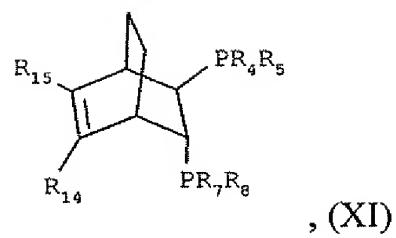




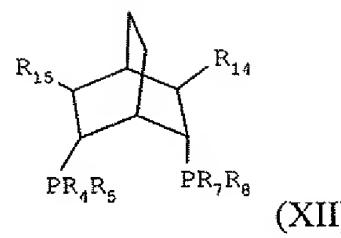
in which

$R_9$  denotes hydrogen,  $C_1-C_8$ -alkyl,  $C_1-C_4$ -fluoroalkyl, unsubstituted phenyl or phenyl substituted with 1 to 3 F, Cl, Br,  $C_1-C_4$ -alkyl,  $C_1-C_4$ -alkoxy or fluoromethyl;

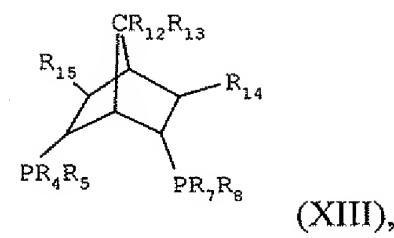




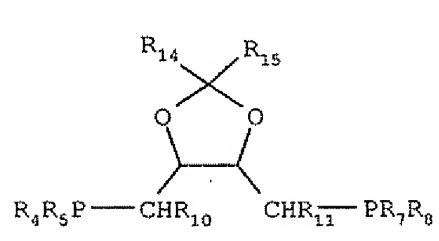
, (XI)



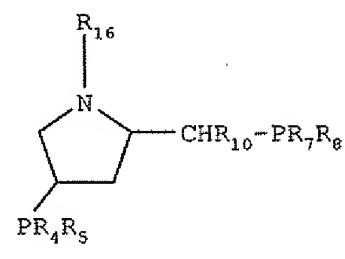
(XII),



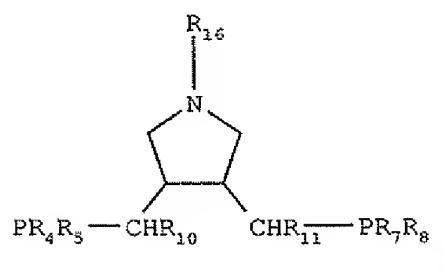
(XIII),



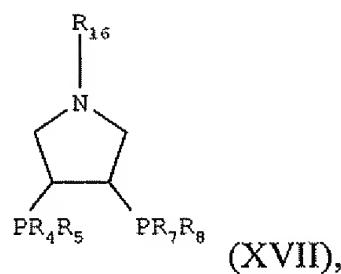
(XIV),



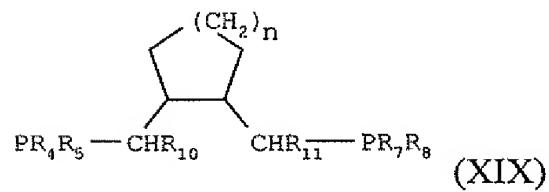
(XV),



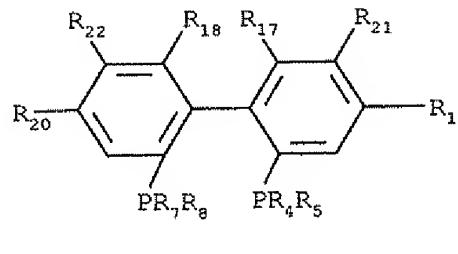
(XVI),



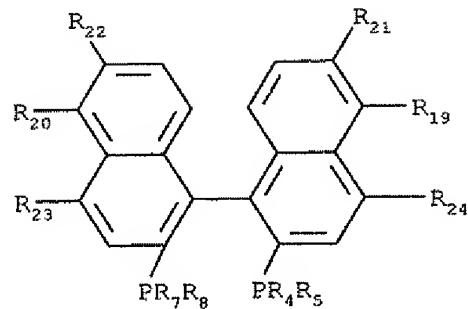
(XVII),



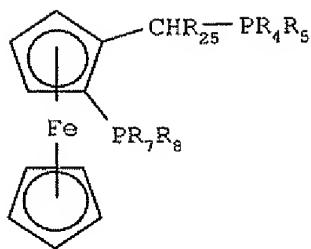
(XIX)



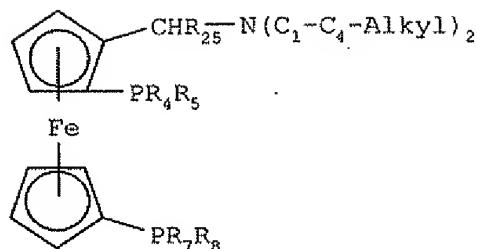
(XX),



(XXI),



(XXII),



(XXIII),

in which

$R_4$ ,  $R_5$   $R_7$  and  $R_8$  have the meanings as recited above,

$R_{10}$  and  $R_{11}$  independently of one another denote hydrogen,  $C_1$ - $C_4$  alkyl or benzyl or phenyl, unsubstituted or substituted with one to three  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy,

$R_{12}$  and  $R_{13}$  independently of one another represent hydrogen,  $C_1$ - $C_4$  alkyl, phenyl or benzyl,

$R_{14}$  and  $R_{15}$  independently of one another denote hydrogen,  $C_1$ - $C_4$  alkyl,  $C_1$ - $C_4$  alkoxy, or benzyl or phenyl, unsubstituted or substituted with one to three  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy,

$R_{16}$  represents hydrogen,  $C_1$ - $C_{12}$  alkyl, unsubstituted benzyl or phenyl, or benzyl or phenyl substituted with one to three  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy,  $C_1$ - $C_{12}$  alkoxy- $C(O)$ -, unsubstituted phenyl- $C(O)$ - or benzyl- $C(O)$ -, or phenyl- $C(O)$ - or benzyl- $C(O)$ - substituted with one to three  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy,  $C_1$ - $C_{12}$  alkyl- $NH-CO$ -, or phenyl- $NH-C(O)$ - or benzyl- $NH-C(O)$ -, unsubstituted or substituted with one to three  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy,

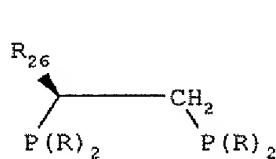
$n$  stands for 0, 1 or 2,

$R_{17}$  and  $R_{18}$  are  $C_1$ - $C_4$  alkyl or  $C_1$ - $C_4$  alkoxy, or  $R_{17}$  and  $R_{18}$  together denote oxadimethylene,

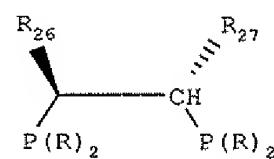
$R_{19}$ ,  $R_{20}$ ,  $R_{21}$ ,  $R_{22}$ ,  $R_{23}$  and  $R_{24}$  are independently of one another H,  $C_1$ - $C_4$  alkyl,  $C_1$ - $C_4$  alkoxy,  $C_5$ - or  $C_6$  cycloalkyl or  $C_5$ - or  $C_6$  cycloalkoxy, phenyl, benzyl, phenoxy, benzyloxy,

halogen, OH, -(CH<sub>2</sub>)<sub>3</sub>-C(O)-O-C<sub>1</sub>-C<sub>4</sub>.alkyl, -(CH<sub>2</sub>)<sub>3</sub>-C(O)-N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub> or -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub>, or R<sub>19</sub> and R<sub>21</sub>, and/or R<sub>17</sub> and R<sub>21</sub>, and/or R<sub>20</sub> and R<sub>22</sub>, and/or R<sub>18</sub> and R<sub>22</sub>, or R<sub>21</sub> and R<sub>23</sub> and/or R<sub>22</sub> and R<sub>24</sub> together represent a fused-on 5 or 6-membered, monocyclic or bicyclic hydrocarbon ring, and

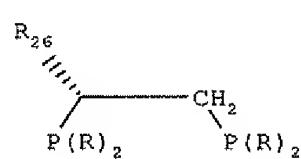
R<sub>25</sub> is C<sub>1</sub>-C<sub>4</sub> alkyl;



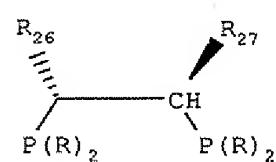
(XXIV),



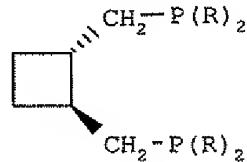
(XXV),



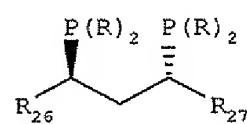
(XXVI),



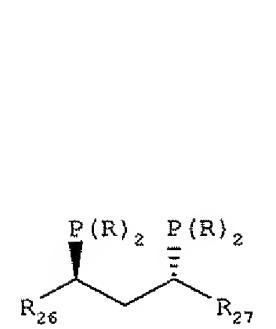
(XXVII),



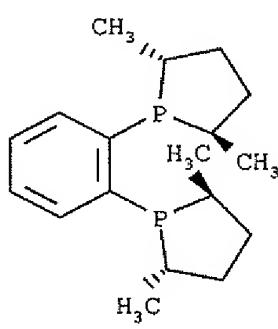
(XXVIII),



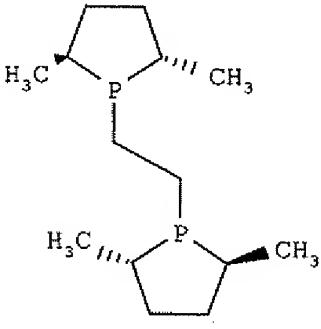
(XXIX),



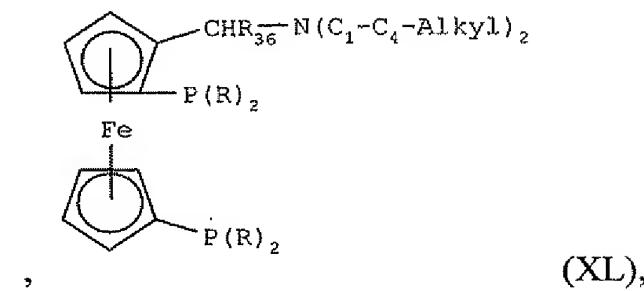
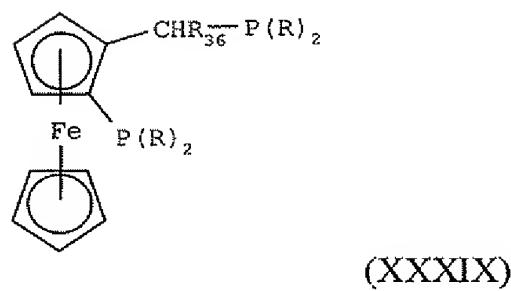
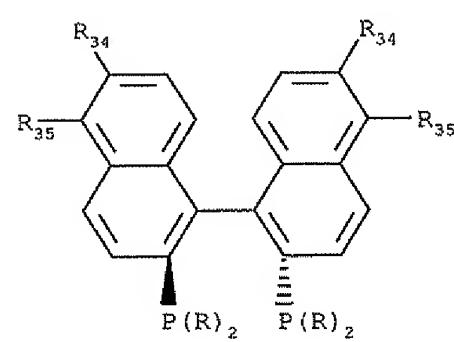
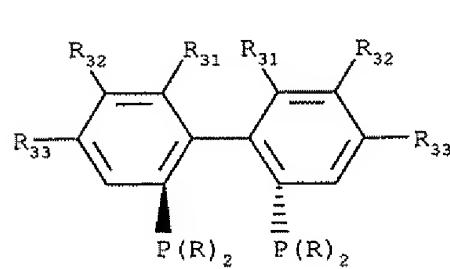
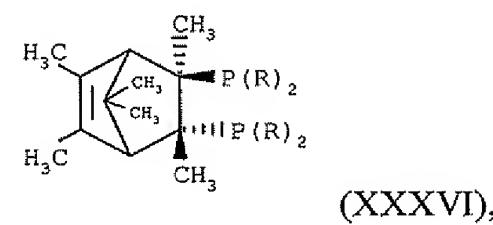
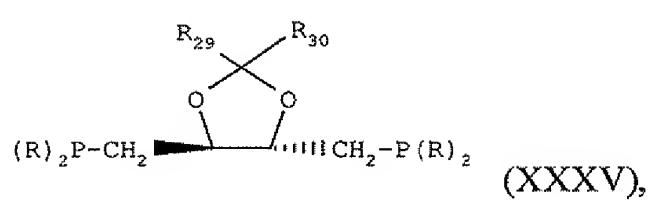
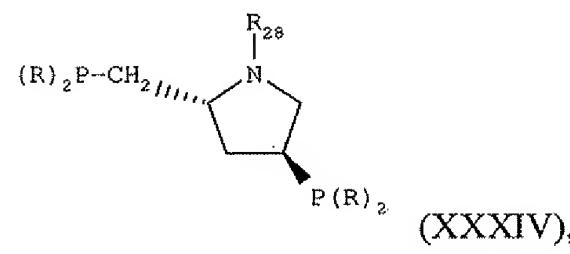
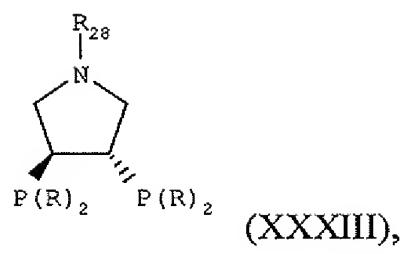
(XXX),



(XXXI),

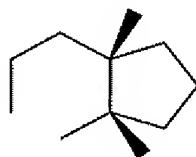


(XXXII),

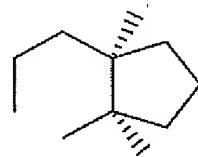


in which

R stands for cyclohexyl or unsubstituted phenyl or phenyl substituted with one to three C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy, trifluoromethyl, or an -NH<sub>2</sub>, (C<sub>1</sub>-C<sub>4</sub>-alkyl)NH-, (C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub>N-, R<sub>26</sub> and R<sub>27</sub> independently of one another denote C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl or benzyl, R<sub>28</sub> represents C<sub>1</sub>-C<sub>8</sub>-alkyl, C<sub>1</sub>-C<sub>8</sub>-acyl or C<sub>1</sub>-C<sub>8</sub>-alkoxycarbonyl, R<sub>29</sub> stands for hydrogen, C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl or benzyl, R<sub>30</sub> represents C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl or benzyl, R<sub>31</sub> denotes methyl, methoxy, or both R<sub>31</sub> together denote oxadimethylene, R<sub>32</sub> and R<sub>33</sub> independently of one another represent H, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy or (C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub>N-, R<sub>34</sub> and R<sub>35</sub> independently of one another represent H, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy, -(CH<sub>2</sub>)<sub>3</sub>-C(O)-O-C<sub>1</sub>-C<sub>4</sub>-alkyl, -(CH<sub>2</sub>)<sub>3</sub>-C(O)-N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub> or one pair R<sub>34</sub> and R<sub>35</sub> together represents a radical of formula XLI and the other pair R<sub>34</sub> and R<sub>35</sub> together represents a radical of formula XLII



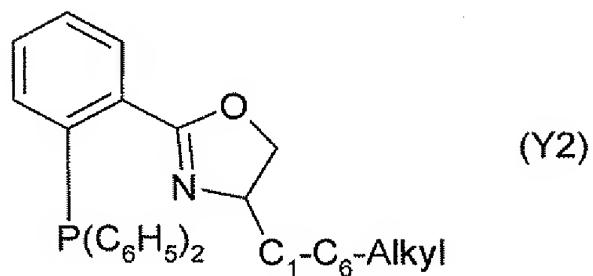
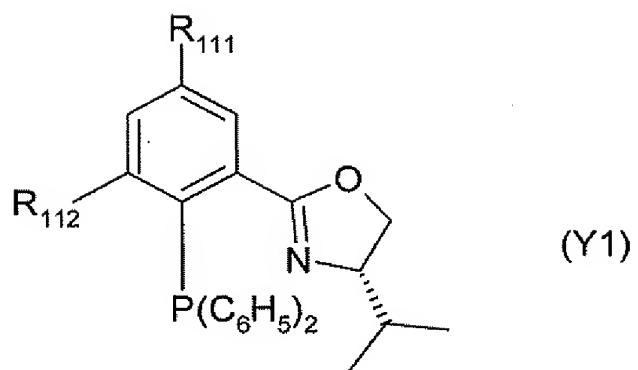
(XLI),



(XLII),

and

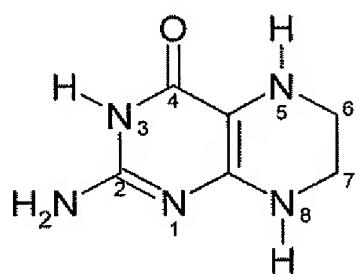
R<sub>36</sub> stands for C<sub>1</sub>-C<sub>4</sub>-alkyl,



wherein R<sub>111</sub> and R<sub>112</sub> are each independently H or methyl.

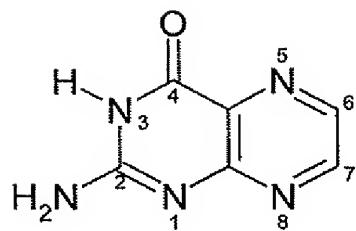
15-28. (Cancelled)

29. (Previously Presented) A process for preparing tetrahydropterin of the following formula



or a tetrahydropterin compound of said tetrahydropterin that is substituted at the 6-, or 7- or 6- and 7- position or positions,

comprising hydrogenating pterin of the following formula



or a pterin compound of said pterin that is monosubstituted at the 6-, or 7- or 6- and 7- position or positions,

with hydrogen in alcohol or in alcohol in admixture with an organic solvent in the presence of a hydrogenation catalyst that is a metal complex that is soluble in the reaction medium.

30-32. (Cancelled)

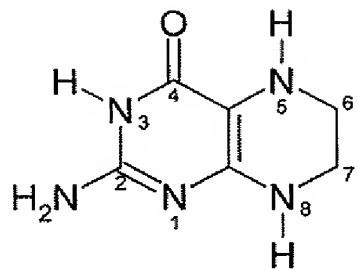
33. (Previously Presented) A process according to claim 3, wherein the hydrogenation is carried out at elevated pressure.

34. (Previously Presented) A process according to claim 1, wherein the metal complex contains iridium, rhodium or ruthenium.

35-36. (Cancelled)

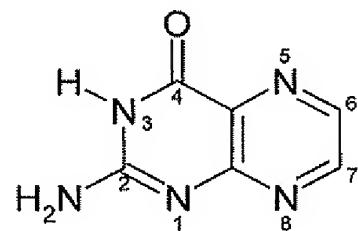
37-39. (Cancelled)

40. (Previously Presented) A process for preparing tetrahydropterin of the following formula



or a tetrahydropterin compound of said tetrahydropterin that is substituted at the 6-, or 7- or 6- and 7- position or positions,

comprising hydrogenating pterin of the following formula



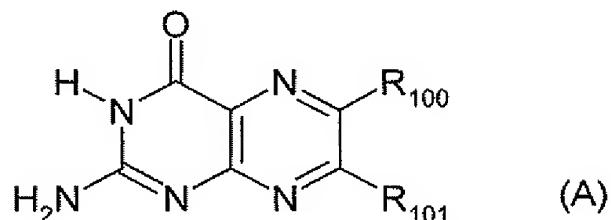
or a pterin compound of said pterin that is monosubstituted at the 6-, or 7- or 6- and 7- position or positions,

with hydrogen in alcohol or in alcohol in admixture with an organic solvent in the presence of a hydrogenation catalyst that is a metal complex that is soluble in the reaction medium, wherein the pterin compound is folic acid, a folic acid salt, a folic acid ester, a folic acid ester salt or a dihydro form thereof, with the proviso that in the event of using folic acid, a carboxylic acid thereof or a dihydro form thereof, the reaction medium is aqueous, and in the event of using a folic acid ester, a folic acid ester salt or a dihydro form thereof, the reaction medium is an alcohol.

41-44. (Cancelled)

45. (Previously Presented) A process according to claim 1, wherein the pterin compound is a pterin that is substituted in the 6- position.

46. (Previously Presented) A process according to claim 1, wherein the pterin compound is of formula (A)



in which

R<sub>101</sub> is H or independently has the meaning of R<sub>100</sub>, and

R<sub>100</sub> is an organic radical attached via a C, O or N atom and having 1 to 50 carbon atoms.

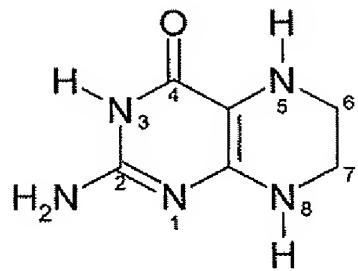
47. (Previously Presented) A process according to claim 46, wherein R<sub>100</sub> contains 1 to 30 carbon atoms and is not interrupted or is interrupted by one or more of -O-, -NH-, -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)-, -C(O)-, -C(O)O-, -OC(O)-, -OC(O)O-, -C(O)NH-, -NHC(O)-, -NHC(O)O-, -OC(O)NH-, -NHC(O)NH-, -C(O)N(C<sub>1</sub>-C<sub>4</sub>-alkyl)-, -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)C(O)-, -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)C(O)O-, -OC(O)N(C<sub>1</sub>-C<sub>4</sub>-alkyl)-, -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)C(O)N(C<sub>1</sub>-C<sub>4</sub>-alkyl)-, and which is unsubstituted or is substituted with F, Cl, Br, -CN, -OCN, -NCO, -OH, -NH<sub>2</sub>, -NHC<sub>1</sub>-C<sub>4</sub>-alkyl, -N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub>, C<sub>1</sub>-C<sub>4</sub>-alkyl, C<sub>1</sub>-C<sub>4</sub>-haloalkyl, C<sub>1</sub>-C<sub>4</sub>-hydroxyalkyl, C<sub>1</sub>-C<sub>4</sub>-alkoxy, C<sub>1</sub>-C<sub>4</sub>-haloalkoxy, -C(O)OH, -C(O)OM<sub>100</sub>, -C(O)OC<sub>1</sub>-C<sub>4</sub>-alkyl, -C(O)NH<sub>2</sub>, -C(O)NHC<sub>1</sub>-C<sub>4</sub>-alkyl, -C(O)N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub>, R<sub>102</sub>-C(O)O-, R<sub>102</sub>-OC(O)O-, R<sub>102</sub>-C(O)NH-, R<sub>102</sub>-C(O)N(C<sub>1</sub>-C<sub>4</sub>-alkyl)-, R<sub>102</sub>-NHC(O)NH-, R<sub>103</sub>C(O)- or -CH(O), wherein

M<sub>100</sub> is Li, K, Na, NH<sub>4</sub><sup>+</sup>, or ammonium with 1 to 16 carbon atoms,

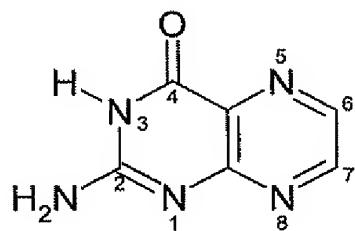
R<sub>102</sub> is C<sub>1</sub>-C<sub>8</sub>-alkyl, C<sub>5</sub>- or C<sub>6</sub>-cycloalkyl, phenyl or benzyl, and

R<sub>103</sub> is C<sub>1</sub>-C<sub>4</sub>-alkyl, phenyl or benzyl.

48. (Previously Presented) A process for preparing tetrahydropterin of the following formula

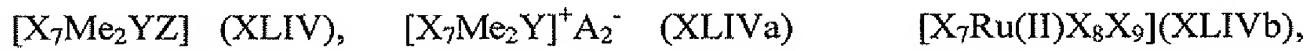


or a tetrahydropterin compound of said tetrahydropterin that is substituted at the 6-, or 7- or 6- and 7- position or positions,  
 comprising hydrogenating pterin of the following formula



or a pterin compound of said pterin that is monosubstituted at the 6-, or 7- or 6- and 7- position or positions,

with hydrogen in a polar reaction medium in the presence of a hydrogenation catalyst that is a metal complex that is soluble in the reaction medium of formula XLIV, XLIVa or XLIVb,



in which

Y stands for monoolefin ligands or a diene ligand;

$X_7$  represents an achiral or chiral ditertiary diphosphine, that forms a 5 to 7 membered ring with the metal atom  $Me_2$  or  $Ru$ ;

$X_7$  represents an achiral or chiral ligand that forms a 5 to 7 membered ring with the metal atom  $Me_2$  or  $Ru$ , wherein said ligand contains two tertiary phosphine groups;

Me<sub>2</sub> denotes Ir(I) or Rh(I);

Z represents -Cl, -Br, or -I; and

A<sub>2</sub> is ClO<sub>4</sub><sup>-</sup>, CF<sub>3</sub>SO<sub>3</sub><sup>-</sup>, CH<sub>3</sub>SO<sub>3</sub><sup>-</sup>, HSO<sub>4</sub><sup>-</sup>, BF<sub>4</sub><sup>-</sup>, B(Phenyl)<sub>4</sub><sup>-</sup>, PF<sub>6</sub><sup>-</sup>, SbCl<sub>6</sub><sup>-</sup>, AsF<sub>6</sub><sup>-</sup> or SbF<sub>6</sub><sup>-</sup>;

X<sub>8</sub> and X<sub>9</sub> are the same or different and have the meaning of Z or A<sub>2</sub>, or X<sub>8</sub> has the meaning of Z or A<sub>2</sub> and X<sub>9</sub> stands for hydride.

49. (Previously Presented) A process according to claim 6, wherein R<sub>1</sub> and/or R<sub>2</sub> are, each independently,

pyrrolidinyl, piperidinyl, morpholinyl, tetrahydropyranyl, piperazinyl, pyrrolidinyl methyl, pyrrolidinyl ethyl, piperidinyl methyl, piperidinyl ethyl, morpholinyl methyl, morpholinyl ethyl, tetrahydropyranyl methyl, tetrahydropyranyl ethyl, piperazinyl methyl or piperazinyl ethyl.

50. (Cancelled)

51. (Previously Presented) A process according to claim 14, wherein the catalyst has a ligand that is of formula Y1 or Y2.

52. (Previously Presented) A process according to claim 14, wherein the reaction medium is an alcoholic reaction medium.

53. (Previously Presented) A process according to claim 14, wherein the reaction medium is an aqueous reaction medium.

54. (Previously Presented) A process according to claim 14, wherein the catalyst has a ligand that contains one or more water-solubilising polar substituents.

55. (Previously Presented) A process according to claim 14, wherein the catalyst has a ligand that is of formula IV.

56. (Previously Presented) A process according to claim 14, wherein the catalyst has a ligand that is of formula V, VI, VII, VIII, IX, X, XI, XII, XIII, XIV, XV, XVI, XVII, XIX, XX, XXI, XXII or XXIII.

57. (Previously Presented) A process according to claim 14, wherein the catalyst has a ligand that is of formula XXIV, XXV, XXVI, XXVII, XXVIII, XXIX, XXX, XXXI, XXXII, XXXIII, XXXIV, XXXV, XXXVI, XXXVII, XXXVIII, XXXIX, or XL.